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# Decrease in the HealthCare Demand in Rural China: A side effect of the industrialization process ?*

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**Abstract**

In China, with the economic reforms leading to the raise in agricultural productivity, the rural healthcare organisation has been weakened. In a 1991-2006 database, a decrease in the healthcare demand is observed. If many papers study the effect of the insurance system (NCMS) on the healthcare demand, other factors explaining the healthcare demand have not received much research attention yet. We use a matching and difference in difference model to correct for the selection bias on insurance effect. If the income level and insurance enrollment plays a major role on the healthcare demand, we shed light on the peer effect of the industrialization process and the changes affecting healthcare facilities. In a context of healthcare price widely increasing, the change in villagers working activity leads to an increase in the inequality of healthcare access (due to inequality of wage, mobility, and private insurance). The result is a reduction and sometimes worse, an exclusion from the healthcare access for the poorest. A public policy has to be conducted to support farmers, in particular in areas where a significant part of the village inhabitants have an industrial activity.

Keywords: Healthcare demand, Health insurance, Healthcare suppliers, Inequality, Industrialization process, China.

JEL Classification: D82, H52, I18.

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# 1 Topic

Financial hardship caused by ill-health is becoming one of the top reasons accounting for impoverishment in rural China (Liu, 2006). If many sources can be found, a large part of the literature focuses on health insurance effect. In this paper, we explore three major factors that may explain the variation in the healthcare demand: *i)*, the insurance system; *ii)*, the change in healthcare facilities access including the price and the geographical distribution ; *iii)* the urbanization and the industrialization process. The results shed light on the peer effect of the industrialization process due to the changing patterns of healthcare utilization.

The most commonly studied topic in the litterature is the insurance effect on the healthcare demand. Before the economic reform, the rural healthcare organization was based on the Cooperative Medical Service (CMS). The CMS can be viewed as an almost full-insured program. This program ensured access to basic medical services for China's rural population. The contribution was financed by the collective welfare fund. With the de-collectivization of agriculture, the welfare funds were sharply reduced and in some areas, they were dismantled (Zhu *et alii*, 1989; Liu, 2004). By 1993, less than 7 percent of the rural population was covered by the CMS. The question of the healthcare access became an acute issue. Accumulating evidence highlighted that high and rapid increase in expenditures from using health facilities were causing widespread poverty and deterring families, especially poor ones (Wagstaff *et alii*, 2009). As a response, China adopted a new health insurance system, the New Cooperative Medical Scheme (NCMS) in 2003. Beginning with only 310 out of China's 2,861 rural counties in 2004 (Mao, 2005), its coverage had expanded to 2,451 counties by the end of 2007, accounting for 86 percent of all rural counties in China (Wen, 2008). A growing litterature assesses the impact of this NCMS policy on the change in healthcare demand (Wagstaff and Yu (2007), Wagstaff *et alii* (2009), Lei and Lin (2009). As well Wagstaff *et alii* (2009) as Lei and Lin (2009) find some mitigate evidence of an impact of the NCMS on the healthcare demand. [1]In this paper, we assess the NCMS effect control for healthcare price controlling for the healthcare facilities change and the industrialization process, which was not done before.

Since the early 80's, the policies regarding hospital finance has changed. At the beginning of the economic reforms, state financing constituted about 60% of hospital revenues. By 2003, it had fallen to 8%. To make up for the shortfall, hospitals have come to regard drugs sales as one of their main sources

[1]Wagstaff *et alii* (2009) found that the NCMS has had no impact on cost per case. However, it has increased the likelihood of people seeking outpatient and inpatient care, as well as the volume of care provided. Lei and Lin (2009) found that the NCMS significantly increases the utilization of preventive care, but we do not find improvement in either formal medical service use or in health status.

of revenue. Drugs account for roughly half of total expenditures, representing 43% of expenditures per inpatient visit and 51% of expenditures per outpatient visit (Eggleston 2008). The result is an increase in the healthcare price. In rural areas, the health spending increased almost 7-fold between 1990 and 2002, much faster than per capita income and prices generally (Eggleston, 2008). The fiscal decentralization reform also contributed to a change in the access to healthcare services. Indeed, according to the wealth of the area, the county or township governement may not have the financial capacity to maintain the healthcare system. In the same time, the government encourages the creation of private community clinics or the transformation of public health facilities into private ones. Therefore, this reform led to some changes in the healthcare facilities geographical distribution that may affects the healthcare demand. A concentration of public healthcare facilities in the higher density areas is observed. Akin *et alii* (2005) show that while the distance to clinics reduced significantly, travel distances to public hospitals increased for all strata of communities. Because an increasing number of clinics are private, the access for the poorest may then be an issue. We here assess the effect of the health facilities organization changes on the healthcare demand.

The industrialization and urbanization process may also explain the change in the healthcare demand. The urbanization is *(i)* the consequence and *(ii)* the cause of the internal migration: *(i)*, the result of the internal migration is the increase in the number of people living in the city. The share of the population living in cities has stretched from 30% to 70% since the economic reforms started. This process may also contribute to concentrate the public hospitals in the higher density areas; *(ii)*, because of the infrastructure developpment, the need for workforce in cities rise and leads to an increase in the internal migration. Moreover, more people living in rural area may have a job in industrial sector with an higher wage than with an agricultural activity. They may also benefit from the firm of health insurance. Very few studies documented its extend. Liu *et alii* (2003) show that urbanization leads to a significant and equitable increase in insurance coverage. However, the authors finds no association between the level of urbanization and the probability of using care after controlling for health insurance and the severity of illness in the access model. We also examine the industrialization effect on the healthcare demand.

From the China Health and nutrition Survey (CHNS) over the 1991-2006 period, we set up the determinants of the healthcare demand. If many papers study the effect of NCMS on the healthcare demand, others factors such as the industrialization process or the healthcare facilities change, explaining the healthcare demand have not received much research attention yet. We show that the changing patterns of healthcare utilization lead the industrialization process to have some "side" effects on the healthcare demand. The change of working activity for village inhabitants and the development of transportation system are keys to this "side" effect. Why? With the industrialization process, the percent of rural inhabitants working in industrial activity rises. This industrialization process that goes along with

urbanization not only drives people to live permanently in urban areas but also creates a category of people who work in a place without permanently settling in it. This covers diverse situations, from daily commuting to floating long-term migration.[2] Because of higher wages than in agricultural activity, the latter are more likely to be able to have access to the private village clinic.[3],[4] Not only these people may afford to go to private village clinics but also may have access to healthcare facilities in their working place, may have an easier access to township hospitals and/or they likely have an health insurance from their job in industrial sector that cover private healthcare expenses. This raises the critical questions of healthcare access for the poorest, namely part of the farmers.

In Section 2, we present the Chinese setting on healthcare organization and healthcare insurance. Data information and some preliminary statistics are given Section 3. In Section 4, we present the econometric models . In Section 5, we set up the urbanization as a key factor of healthcare access. We also present results of propensity score matching (PSM) estimations, controlling for a non-randomized subscription to the NCMS on the results and discuss the robustness checks. Section 6 concludes.

## 2 The change in healthcare services

The basis of the rural healthcare organisation is the Cooperative Medical System (CMS). This system was implemented in rural China in the 1950s (Yip et al., 2008). It was organized at the village [5]level and managed by the CMS Management Committee, consisting of village administration representatives and the community clinic.

The CMS had organized healthcare with three levels, called the three tier structure. In the first tier, part-time "barefoot" doctors in health clinics provided preventive and primary care. Barefoot doctors are villagers who had short training courses. For more serious illnesses, they referred patients to the second tier: commune health centres, which might have 10 to 30 beds and an outpatient clinic serving a population of 10,000 to 25,000 and which were staffed by junior doctors. The commune health centres

[2]In China, the term "migration" recovers internal migration. People from rural area go to work in urban area. However, this migration is **geared** (freiner) by the residence permit, the "hukou". A part of this population is then considered as floating. They live in two areas, the working place and the hometown. There is a lot of debate on the definition of the floating population and the percent of this population. Only one thing is certain, the part of migrant population is significant and rapidly increasing but they do still not have the same right on public services as the population with the right permanent "hukou" of the urban area.

[3]The public health insurance does not cover private healthcare expenditure.

[4]In most of the village, there is no more than one clinic.

[5]In the following, the terms "village" and "community" represent the same area.

referred to the third tier the most seriously ill patients: county hospitals, staffed with senior doctors. This three-tier system was managed and financed locally. It was established for rural population, through which the farmers could access primary health care almost for free. The scheme was financed by collective welfare funds, subsidies from upper level government.

The CMS developped quickly and widely in its early years. In 1978 it covered around 90% of rural residents (Liu and Cao, 1992). Although a relatively low level of quality, this program helped reduce China's mortality rate during the 1960s and 1970s (Sidel, 1993). With the end of the collective economy in the early 1980s, most villages lost their collective welfare funds, which in turn resulted in the loss of the main source of financing for the CMS. [6]As a result, counties began dropping the program and coverage rates fell sharply from 90 percent in 1980 to 5 percent in 1985 (Liu and Cao, 1992). Despite various attempts to rebuild an insurance system, the majority of rural residents remained uninsured between 1985 and 2003 (Yip and Hsiao, 2008). Then, in 2003, a health insurance system called the New rural Cooperative Medical System (NCMS) was implemented. Compared with the former CMS that was based on a universal basis, the NCMS is on a voluntary basis.[7] First, the county has to voluntarily adopt the NCMS insurance system. Then, the household voluntarily subscribes. For the NCMS, the premium is paid by household and subsidized by government, with financial obligations of all level governments whereas the old-CMS was managed and funded by both village collectives and farmers, without other financial obligations. So, the risk pool level is at the county level for the NCMS and not anymore at the township or community level. The novelty of the NCMS is also some broad guidelines issued by the central government, provincial and county governments even if they retain considerable discretion over the details. About the covered services, the NCMS focuses on inpatient services whereas the old-CMS focused on prevention and health care (Smith, 1993; You *et alii* (2008)). In China, people really care about the health prevention. They use traditional medecine as such plants to prevent diseases. The behaviour for sick people is less predictable. This may also explain the lack of real increase in healthcare demand although the implementation of the NCMS.

Besides the insurance system change, some changes are also observed for the hospitals themselves. From a previous situation where the budget of rural health facilities was heavily financed by the government, the public contribution represents today less than 8% of the total revenue of hospitals. That is

[6]At this period, the Cooperative Medical System became a generic name for all health insurance developped by a public authority (community, county, ...). Therefore, there were as much different types of public health insurance as communities that said have a CMS health insurance.

[7]This decision was motivated by widespread dissatisfaction in rural areas with a proliferation of fees and taxes. In order to reduce the tax and fee burden of rural residents, the government has eliminated a number of rural taxes and reduced others (Yep, 2004; Lin, 2005). In this context, it was seen as difficult to introduce a new mandatory charge.

even less in rural health facilities. During the period 1979-1991, the government introduced a co-payment system. The aim was to change the hospital incentives to push them to increase the level of quality (Du, 2009). These change led a trend toward a professionalization of the medical delivery system. However, the main source of profit now comes from drugs sales. Over-prescribed drugs and high-tech diagnosis is often considered as the source of healthcare increase (Eggleston *et alii*, 2008; Wang, 2005).[8] Currently, the care the system delivers is judged both more costly and more sophisticated than is medically necessary (World Bank, 2004; Blumenthal and Hsiao, 2005; Liu and Mills, 1999). That has likely a direct impact on the decrease in health care demand.

Since the 80s, reforms of the health sector also pushed to the privatization of community clinics. New private clinics surfaced in rural communities. A rapid spread of private clinics at the community level replaced the public ones. Services provided by private clinics are often of better quality but more expensive than the former public community clinics (Smith, 1998). The reduction of financial support is also explained by the 1990s' fiscal decentralization reform. The responsibility to fund the health sector lies in local governments. The regional disparities in economic development have led to dramatically reduce health facilities in poorer areas. These areas were unable to charge user fees to raise the funds needed to compete with the physician compensation packages offered by facilities in wealthier markets (Akin *et alii*, 2005).

In other words, a centralization of the public healthcare services is observed. Beside the debate on the healthcare price for private healthcare facilities versus public ones (see Liu *et alii*, 2006), the public health insurance covers the healthcare charge from public facilities. The proximity of the urban area where are set up the county hospital medical services may have an impact on the healthcare demand.

# 3 China Health and Nutrition Survey

## 3.1 The data

We use the China Health and Nutrition Survey (CHNS). The CHNS covers nine provinces that vary substantially in terms of geography, economic development, public resources, and health indicators. With data sets covering four counties in each surveyed province, this sample includes 36 counties overall. The first survey round of the CHNS was conducted in 1989. Six additional rounds were conducted in 1991, 1993, 1997, 2000, 2004, and 2006. This survey was conducted by the Carolina Population Center from the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food

[8] Wang (2005) suggests that the government subsidy for the NCMS does not actually reach to the farmers but to the health providers.

Safety from the Chinese Center for Disease (Lei and Lin, 2009). This large-scale longitudinal survey was conducted using a multistage, random cluster process.

Because the rural and urban population are different in many more ways than just geographic consideration, it is not pertinent to work these two populations in one model. Considering a dummy variable for rural area is far from enough to capture all the difference between these two populations.[9] As urban and rural health care systems are segmented in China, previous litterature (Liu et alii, 2003) note that it is more appropriate to treat urban and rural population groups as two differently distributed samples for empirical studies. In terms of healthcare, one of the major reform is the New Cooperative Medical System (NCMS).[10] This reform targets rural areas. Therefore, we choose here to work on rural areas. To define the healthcare demand, we work on the population who self declares health trouble. The data covers 128 rural communities in 1991 and 1993, 127 rural communities in year 1997, 145 rural communities each in other years. In each community, 20 households are surveyed. The database contains 5 529 observations.

### 3.2 Preliminary evidence

We observe an important decrease in the visit to a doctor. In the same time, more and more people prefer to use self-medication than to visit a doctor (Table 1). The percent of people who looked for healthcare is decreasing from 1991 to 2004. Many studies find significant and apparently non-random reductions in care utilization during the last two decades (Bloom and Gu 1997; Hesketh and Zhu 1997; Gao *et alii*, 2001). These changes have elicited a great deal of concern, particularly since reductions in utilization have often been particularly dramatic for less advantaged groups.

The year 2006 is the first year when an increase of healthcare demand is observed. Because the NCMS is implemented in 2003, the intuition is that this increase is due to the NCMS (Table 1). Therefore, we consider two samples according to the subscription of an insurance. For uninsured people, we also observed this increase in healthcare demand for the year 2006. These first preliminary results suggest that the increase in healthcare demand observed in 2006 is not due or not only due to the insurance program implementation.

Table 2 displays results on the subjective health. If the share of people in good health status is stable, the share of people in bad and very bad health increases. In other words, we observe a deterioration of the health status for people formerly in fair health.

[9] Of course, we also consider more subtil models but Chow test validates the assumption of two different models.

[10] See above for details on the NCMS

As said before, previous to 2003, the Cooperative Medical System was a generic name for all health insurance developped by a public authority (community, township, county). Therefore, there were as many different types of public health insurance as communities that still provided such a system. In the following, we call this insurance program, the *old-CMS*. On a voluntary basis the county adopts the NCMS starting from 2003. This program is an insurance that covers all the household (and not only the individual). However, the level of coverage varies according to the county. In the following, this program is called *NCMS*. Table 3 displays the results by wave. First, very few counties and individuals still have the old-CMS. Second, we observe that the NCMS is rapidly implemented by counties and subscribed by households.

In order to measure the price of health care, we use the information from the household survey: how much money does a person pay for treatment of cold or flu in the normally used facility by family members? The expenditures for treatment of flu in certain facility can be served as a proxy of price for several reasons. First, this measurement is a comprehensive cost in treatment of flu including service fee of the doctor, drug expenditures and examination fees. Second, this measurement is based on the service of almost same quality, i.e. treatment of cold, which makes it comparable between different facilities and over time. Furthermore, we take average of the reported value spent on treatment of flu in village clinics in a community to proxy healthcare price in village clinic and take the average amount spent on flu in county hospital to proxy county-hospital price.[11] We do not have an id for township, so we use the average value spent in a township hospital in a community to get the price level of township hospital. The following table compares the price change over time in various facilities. The price has been adjusted to year 2006 using the price index offered by CHNS dataset. Table 3 displays the results. Prices at both levels are increasing over time. Price in community clinics increased 2-fold and in county hospitals increased almost 3-fold between 1997 and 2006. The increase is much more important when we consider the whole period of observation. The price in community clinics is around 4 RMB in 1991 and goes up to 26 RMB in 2006. Because the price has been adjusted using price index, it is observed that the healthcare price increased more than the overall inflation level.

The percent of farmers decreases over the years. It was about 67% in 1991 to decrease to 45% in 2006. In the same period, the average wage increases from 3, 000 RMB per year and household to 7, 400 RMB in 2006 (Tables 4 and 5). If the number of farmer decreases over the time and the average income increases over the time, what about the inequality? We use the Gini index to measure the inequality. It clearly appears that the inequality increases over the year. It was about 0.37 in 1991 to reach 0.49 in 2006.

[11] A community or village is included in a township that is itself included in a county that is itself included in a province.

We also provide some preliminary statistics by area. Overall, we observe a significative variance between Chinese areas. The healthcare price as well as the percent of insured people or the healthcare demand vary between areas. The NCMS is adopted by the county of the voluntary basis that may explain the percent of NCMS varies according the area. These variances are also observed for the proportion of farmers (Table 4) and the average income (Table 5) or the indexes of inequality (Gini indexes). In 2006, the proportion of farmers is 18% for Jiangsu province whereas 66% for Heilongjiang province. The percent of farmers is an indicator of the change in working activity. We observe a large trend of the change in working activity and a wide disparity according to the area.

Table 6 displays results on facilities geographical distribution. If more and more villages have a clinic, we observe an increase in the number of private facilities and no trend in the number of healthcare facilities. Therefore, the share of public hospital is decreasing. Meanwhile, the distance to the community clinic or township clinics has been reduced. Henceforth, the health facilities of proximity have been developped but these facilities are private facilities. That echoes Akin *et alii* (2005)'s results. During the 1991-2006 period, there was a policy to incent to the set up of private clinic hospitals. The privatization of the healthcare facilities is paralleled with the increase of the inequality. The question of access for the poorest could be an issue.

We observe a general improvement of the urbanization over the year, as Liu *et alii* (2006). More accurately, we note a improvement of the road condition. The roads were mainly in dirt and stone in 1991 to become more and more pavel or in mixed material. The infrastructure of communication (the phone system) is also improved with the developpment of the phone system and a higher proximity of the postal service for Chinese villagers. In the same time, we also observed an increase in the trade activity.

# 4 Estimation strategy

In this paper, the healthcare demand is explained at the individual level.

## 4.1 The estimation

Consider individual $i$ in the county $c$ of the province $p$ at the year $t$. Let $HC_{icpt}$ be the dependent variable that a binary variable indicating whether the individual answers "visit a doctor" to the question "what do you do when sick?". We can specify a general function form as following:

$$P(HC_{ict} = 1|X_{ict}, \mu_c, \nu_t) = G(x_{ip}, \mu_c, \nu_t; \epsilon_{ict}) \tag{1}$$

Where G(.) is a known function taking values in the open unit interval; $X_{ict}$ is the vector of individual characteristics and socioeconomic conditions for individual $i$ in the county $c$ of the province $p$ at the year

*t*. Anderson and Newman (1973) consider three groups of factors for $X_{ict}$ that determines the healthcare use. *i)*, the predisposing factors including age, gender, education, marital status and job status; *ii)*, enabling factors including income and insurance coverage; *iii)*, need factors that refer to one's health status and disease conditions. In this paper, we follow this framework. $\mu_c$ and $\nu_t$ are vectors of fixed effects. $\nu_t$ is the time effect that controls for a time trend for the year 1991, 1993, 1997, 2000, 2004 and 2006. $\mu_c$ is a vector of fixed effect controlling for individual geographic location. Indeed, if the broad guidelines issued by the central government and the provincial one, these latter retain considerable discretion over the details. Theorically, the concrete implementation of the policy is decided at the community level. However, some aspects of the implementation depend on the community. For instance, the rule for the NCMS implementation is on a voluntary basis. Actually, in some communities, the choice is decided collectively. Then, the NCMS system is subscribed by all or a large part of the community. Because of the too few number of individual in some communities, the results can be biased. The estimation of nonlinear panel data models with fixed effects by MLE is known to be biased, when for one dimension, the number observation is fixed (here, the number of interviewed by community) and for the other dimension (here the number of community), there is a large number of observation, the number of fixed effect parameter (here the community fixed parameters) is unbounded with available information on the fixed effect being fixed, which in general yields inconsistent estimators. Therefore, we also perform a community specific random effect model controlling then for province specific fixed effect. Note that for each model, Hausman's test performed validitates the community specific fixed effect assumption. $\epsilon_{ict}$ control for all unobserved residual effects on $P(HC_{ict})$.

The NCMS policy may have two effects. The first one is a direct effect, the household enrollment in the NCMS insurance. However, the presence of the NCMS program in the community may also have effect on the community whatever the insurance subscription. This effect is measured at the community level.

The implementation of the NCMS in counties is not randomized. NCMS pilot counties are not randomly selected. These early pilot counties are likely to have higher levels of income, capacity, and political will to implement (Lindelow and Wagstaff, 2005). Moreover, households who decided to subscribe are likely to have some specific characteristics. If the selection biases resulting from unobserved characteristics are constant over time, then we can remove them by using a differences-in-differences estimation. Differences-in-differences model compares differences in each individual's outcome, before and after an individual began participating in the NCMS. The control group includes individuals who did not participate in the NCMS. This group identifies the time path of outcomes that would have happened in the absence of the treatment. The time effects capture differences over time that are common to all groups. This method is applied for the NCMS subscription index and for the NCMS community implementation.

### 4.2 Urbanisation factors including industrialisation factors

In Liu *et alii* (2003)'s paper, the urbanization is defined as an index categorized into three levels. This index is obtained from summation of three major sets of variables: the density approach, the forces driving the urbanization process (Lucas, 1988) [12]; the development of specialized industries and services generating higher returns than agriculture [13]; the development of infrastructure. Therefore, all component of the urbanization indexes are mixed together.

If industrialization development is part of the urbanization process, the industrialization development may also have consequences on non-yet-urbanized area. For instance, an increasing percent of village inhabitants working out of the village, in a industrial firm, could be a push factor to developp transportation but without effect on the availability of communication services or a good water sewers that are part of urbanization process. Therefore, the industrialization development may have an effect that is not perfectly correlated with the urbanization process. In the following, we use the term "*side*" effect of industrialization to define this effect.

Considering urbanization indexes used by Liu *et alii* (2003), we propose to consider separatly the direct component of the urbanization on one hand ; on the other hand, the component that can be interpreted as the "*side*" effect of the industrialization process.

$U_{ct}$ is the vector of urbanization characteristics [14]; $I_{ct}$ is the vector of "*side*" effect of industrialization development. We include the percent of people working in other activities than agricultural activity, the percent of people working outside the village, the presence of a bus stop index, the presence of a train station index.

### 4.3 Selection issue: a propensity score model

Using a DinD estimation, we control the estimation for selection bias on unoberved characteritics constant over the time.[15]. However, we may have some bias based on observed characteristics. NCMS pilot counties were selected by a rather complex set of criteria, including local economic development, delivery of health care service. Based on the panel data at community level, we use a Propensity Score Model (PSM) to deal with this problem. Non-participants do not have the same characteristics as participants. Instead of aiming to ensure that the matched control for each participant has exactly the same value of $X$,

[12]This point is defined in Introduction Section as the consequence of the internal migration

[13]This point is defined in Introduction Section as the cause of the internal migration

[14]The vector of urbanization characteristics has been defined in the spirit of indexes defined in Liu *et alii* (2003)

[15]Here, we assume that we have no bias on selection bias based on unobserved characteristics

same result can be achieved by matching on the probability of participation. Pairing treatment and control groups that have similar observable characteristics eliminate potential bias. This assumes that participation is independent of outcomes given $X$. We restrict samples to assure common support. Since the NCMS decision is a household one, variables are all defined at the household level.

We first estimate the propensity score using a logit model that a household chooses to enroll into the NCMS program as a function of the pre-treatment characteristics. The model is then used to predict the probability of visiting a doctor. Then we match each observation from the treatment group with an observation from the control group with replacement based on the nearest propensity scores.[16]

According to the context, we may consider two control groups. Indeed, we have three categories: NCMS households, non-enrolled households living in NCMS counties, and households living in non-NCMS counties. *Proposal A*, we compute the propensity scores on the all sample considering NCMS households as treated and others as the control group. The decison of non-enrollment to the NCMS insurance is here equivalent to the absence of enrollment choice to the NCMS. *Proposal B*, we compute the propensity scores considering NCMS households as treated and non-enrolled households living in NCMS counties as the control group. Then, we use the sample of NCMS counties.[17]. We present the results considering each of these two proposals.

# 5 Results

## 5.1 Healthcare demand

Table A1 displays the results. The need factors have the expected effect. Indeed, the worse the health, the higher the healthcare demand. About the predisposing farctors, women have more healthcare access than men. In rural areas, controlling for the income, the education level does not have any significant effect on the healthcare demand, whereas the social situation has. The reference is to be married. To be unmarried affects significantly positively the healthcare demand whereas the fact to be divorced, separated or widow is negatively correlated with the healthcare demand. One explanation is the seldom status (divorced, separated or widowers) makes people less carefull about their health. Controlling for others variables, to be a farmer does not also play on the healthcare demand.

Enabling factors include income and insurance coverage. The income has a positive and significant effect on the healthcare demand, even controlling for the level of education. To be insured plays a positive

[16]Results are available upon request.

[17]For more details on the choice of control group in such a situation and on the PSM methods, see Wagstaff (2009)'s paper.

and significant role on the healthcare demand. Even if the old public insurance (*old-CMS*) covers a wide number of insurance system, the philosophy itself of a public health insurance increases the healthcare access. One of the major factors to explain the variation of the healthcare demand is the presence of a new insurance market. With a "naive" fixed effect model, we get a significant effect of being insured by the NCMS insurance system on the healthcare demand (Columns (1) and (2)). Actually, Chinese context in 1991 is different from Chinese context in 2006. Moreover, characteristics of the NCMS insured may be different of characteristics of non-NCMS insured. Using a DinD estimation to correct for this bias, the NCMS still plays significantly on the healthcare demand as found by Wagstaff *et alii* (2009).

The NCMS policy may have two effects. The first one is the household subscription to the NCMS. The second effect is the implementation of the NCMS in the village.[18] Whatever the model, the presence of NCMS do not have any significant effect on the healthcare demand.[19] However, the presence of NCMS insurance market may affect negatively the healthcare demand through an increase in the healthcare price. Feldstein (1970) show that physicians raise their fees when insurance becomes more extensive. Without controlling for the price, the effect of the presence of NCMS program in the village could then be biased. Henceforth, we control the model for the price. The presence of the NCMS in the village has no effect on the uninsured (Columns (3) and (4)). Controlling for the price, the results are unchanged (Columns (5) and (6)). Therefore the presence of the NCMS insurance market does not affect the healthcare demand.

Controlling for the province, we get a strong effect of the price Column (6). The price variance within-community is very small for a given healthcare. Therefore, the price effect is not identified for a community fixed effects model.

### 5.2 Urbanization, industrialization and facilities access

We now consider a model including urbanization and facilities access factors. The age and the severity have a positive effect on the healthcare demand. To be a woman also increases the healthcare demand. The social situation has the same effect on the healthcare demand as those explained before.

If the level of education does not have any effect on the healthcare demand, the income does. The level of income affects positively and significantly the healthcare demand. Therefore the income or monetary transfer could be a vector for a policy to encourage the healthcare demand. However for several reasons

[18] As said, the NCMS village have some specific characteristics compared to the non NCMS village. We use a DinD estimation to correct for this bias.

[19] Note that controlling for the community fixed effects, we get a perfect correlation with the index of implementation of the NCMS in the community.

this instrument is not the easiest one to use. First, there are difficulties to control the use of the monetary transfert ; second, the induced demand may distorded its expected effect.

We now turn on the effect of urbanization, industrialization and facilities access on the healthcare demand (Table A2).

First, we focus on the urbanization variables that cannot be interpreted as "side" effect of the industrialization process. Table A2 displays the results including the urbanization indexes. We also run a regression with a comparable set of variables as Liu et alii (2006). [20]The intuition is that the improvement of the area betters the access to the facilities. Individuals are more aware about the importance of their health status and the importance to react rapidly when a health trouble appears. Theorically, we may get a positive effect of the urbanization on the healthcare demand. Actually, the urbanization variables have no significant effect on the healthcare demand. We do not find any direct effect of urbanization on the healthcare demand. This result echoes that in Liu (2006)'s paper.

Second, we focus on the "side" effect of the industrialization process. More acurately, we focus on the "side" effect of the industrial revolution. The increase of the urbanized area lead to an increase in the industrial activity and in the need of labour and so, workers. If a part of these workers work and leave in the urban area, some of them may prefer to work outside the village but live in the village. The land right and the registration permit ("*hukou*") are some factors that incent them to stay in their village. Consequently, in the rural area, the percent of farmer decreases. To test for this effect, we use indexes as the percent of village inhabitants working outside the village for more than one month and the percent of inhabitants with a non agricultural activity. Village inhabitants working outside the village cover a wide range of people's category. It could be from daily commuting to floating long-term migration. The commun point of these people's categories is the need of good framework of transportation. To make this movement, the area of origin needs to have at least basic infrastructure for transportation (road, bus or train station). Therefore, we also control for the indexes of transportation: the presence of the train station and the bus station.

If the bus station index is not significant, the train station plays negatively on the healthcare demand. Focusing on the people's activity: the percent of people working outside the village has a strong and negative impact on the healthcare demand. Therefore, there is a negative side effect of the industrialization process on the healthcare demand.

[20]Because of the important number of missing values, the results are not presented here. The results are available on request.

The road condition is strongly significant. The better the road shape, the higher the healthcare demand. It makes appear the ambigus interpretation of the road shape. On one hand, the road condition allows to outside-workers to get their working place. On the other hand, the road condition improves the community environnment and it participates to the urbanization of the community and so it betters the healthcare access.

We show that the share of private facilities have a negative effect on the healthcare demand. In the preliminary statistics, we already saw that the share of public hospital is decreasing. In overall, we can say that there is a reduction of the public facilities access that is a factor of the decrease in the healthcare demand. This result are relevant with the "side" negative effect of the industrialization process parallel to the change in facilities organization (geographically and financially).

But, who are the victims of these change? We then consider crossed variables between the type of occupation and the percent of villagers working outside (in other words, the percent of internal emigration). It appears that farmers are the ones who are as much excluded of the healthcare market as the percent of internal emigration is important (Columns (7) and (8)). More and more inhabitants of the village have an industrial activity and so, an higher wage than farmers. Some of them, more likely the skilled workers, may get an insurance from their job. The policy acts as both, a push factor for the rapid spread of private village clinics; and, a contributor to the huge increase in the healthcare price. Even with the NCMS program, people may be not reimbursed for visiting a doctor in a facility. The NCMS program contracts with facilities. The healthcare expenses are reimbursed only for these facilities. Currently, the cost for healthcare in the private clinics village is more expensive now than with the former public ones.[21] The increase in county public hospitals healthcare are not totally compensated by the level of coverage of NCMS insurance. So, those with non farmer activity are more likely to afford to visit healthcare facilities. Workers may have an health insurance from their firm that covers part of the private healthcare expenses. Besides, the farmers have less opportunity than the village inhabitants working in industrial activity outside the village, to move out of the area where they live and work. As consequences, the increase in percentage of people with an industrial activity likely increases the inequality of healthcare access condition through the inequality of wage and the inequality of mobility. The village are more likely to have a facility but from farmers point of view, less and less healthcare access.

However, we have to moderate the opposition between farmers and non-farmers. Village inhabitants with non farmer activity is an non homogeneous group. Skilled workers and unskilled workers do not benefit from the same condition. Outside the hometown, they work and live in their workingplace. Even

[21]If there are evidences that the private village facilities are more expensive than the former public ones, there is no evidence that the current price in private facilities is higher than in a public ones (Liu et alii, 2006, Health policy)

being in the city, unskilled workers are likely excluded of all the services provided by the city (private as public on the main cases). Therefore, the proximity in distance to a public healthcare hospital is not a higher proximity of access for them. If they have an higher income, it does not necessarely compensate the price index gap between the homeplace and the working place.

To test the financial exclusion to the community clinics for part of the less advantaged group, we control for the community income and an index of inequality as Gini coefficients. Because the farmers ear less than workers in industrial activity, the decrease in the share of farmers leads to increase the income inequality, what is observed in the preliminary statistics. Controlling for other determinants (Columns (9) and (10)), the Gini index and the community average income do not have any impact on the healthcare demand. It is not the income inequality by itself that affects the healthcare demand but the change of activity. At the same level of wage, some of village inhabitants in an industrial activity have more possibility to get healthcare access: They may benefit of an insurance from their job ; they get more opportunity to move out of the area because the place where they live is not their working place.

Whatever the model considered, the presence of the NCMS insurance in the village does not affect the healthcare demand after controlling for others determinants.

### 5.3 Healthcare demand on PSM sample

From now, the result are conditionned by the assumption of a non selection bias on the observed characteristics. However, a large litterature focuses on a selection bias on NCMS insured (Wagstaff *et alii* (2007, 2009), Liu *et lii* (2006)). Using the matching approach of Wagstaff (2009), Table A3 displays results of Table A2 corrected for this selection bias. To test the robustness of the results, we carry out the differences-in-differences estimation using a sample where non-NCMS households are matched with NCMS households using a PSM method.

On the PSM sample, the results confirm the strong impact of the peer effect of the industrialization process on the healthcare demand. Moreover, corrected for selection bias due to observed characterisitics, the increase in healthcare price has a significant negative effect on the healthcare demand. The inequality index, Gini, also plays negatively on the healthcare demand. The more the inequality, the less the healthcare access. However, the increase in the average income improves the healthcare demand.

## 6 Conclusion and discussion

After more than twenty years of transition and tremendous economic growth, part of China has caught up with the most advanced countries. The economic reforms allowed an outstanding growth in the Gross

Domestic Product (GDP). One consequence is a decreasing proportion of the rural population living in extreme poverty and an improvement of the level of nutrition. Another consequence is a disruption in the rural healthcare organization. The healthcare organization was mainly financed with the village collective welfare funds. With the economics reforms, the village collective welfare funds are then financed by farmers' willingness to give. The complete or partial disparition of this fund led to a crumbling of the healthcare system. The former healthcare insurance system was disintegrated. Rural inhabitants were completely insured for the prevention care and the out-patient visit before the economic reforms. A critical point was attained when less than 10% of the rural population was covered by a health insurance. The Chinese government reacted then by establishing in 2003 a health insurance namely the new rural community medical system (NCMS).

Many studies report significant reductions in healthcare utilization since the begining of the 80s. The report is the following one: individuals practise more the auto-medication than before the economic reforms. The price of the healthcare increased in a drastic way. Finally, individuals auto-declare themselves in a poorest health. In this paper, not only do we assess the effect of insurance and the healthcare price but also the the industrialization process and the healthcare facilities change.

The China Health and Nutrition Survey (CHNS) is a unique and ongoing micro-level eight province longitudinal survey of Chinese households. CHNS survey is realized from successive waves where the same households are questioned. This survey also provides information on communities. From a panel data, over the period 1991 to 2006, we observe a decrease in healthcare demand. We use here a "difference-in-difference " model on a PSM sample to eliminate selection bias. We then shed light on the "side" effect of the industrialization process parallel to the healthcare facilities change to explain the decrease in healthcare demand.

The change from agricultual activity to industrial activity has occured rapidly in China. This increase in the density of the urbanized area and the developpement of the industrial activity also have consequences in rural areas. More and more village inhabitants do not work as farmers anymore. They work outside the village in industrial activity. The industrialization process that goes along with urbanization not only drives people to live permanently in urban areas but also creates a category of people who work in a place without permanently settling in it. It can be situations from daily commuting to floating long-term migration. But, why would an individual not live in the area where he works ? It can be explained by the social network (family, friends, relatives) or the land rights policy. The residency permit "*hukou*" is also an incentive to stay in the village. People rights are only established for the place defined by the *"hukou"*. The rights in terms of public services including healthcare access and NCMS insurance are defined by the place of the permanent residency permit. By definition, migrants do not live in the

town of their permanent residency permit. The change from a rural "*hukou*" to a urban one is almost not possible.[22]Therefore, the question of healthcare demand is an issue for migrants (Hua, 2008 and Milcent, 2010). To get their rights associated to the "*hukou*", they work outside their residency permit but have to live at least part-time in the area of their residency permit in particular in case of health troubles.

Meanwhile, the deep changes in the facilities geographical distribution: *i)* as said, the centralization in higher density area of public healthcare facilities ; *ii)* the development of private clinics where farmers cannot afford to go. The reforms of the health sector led to facilitate the emergence of private infrastructures of health and to precipitate the disappearance of public health centers. Farmers are faced to village clinics that provides healthcare at a cost higher than the former village public ones. Beside, a policy was implemented to improve the level of high-tech equipment and to reduce the government (central government as provincial ones) financial support to public hospitals, to disengage the government from the financial burden. Drugs sales are become the main sources of hospital revenue. As consequence, public hospitals improved the quality of the offered healthcare but at a healthcare cost much more higher than before. Some autors advocated an over-performed of procedures to make profit (Eggleston 2008). Today, if almost all rural inhabitants are covered by the NCMS, the level of coverage that is still far from enough to compensate the healthcare price increase.

This changing patterns of healthcare utilizations and the change in working activity had two consequences. First, workers in industrial activity may have easier access to facilities outside the village: because, they are likely insured by their firms; because of a public facility in proximity of their working place. Second, workers in industrial activity earn more than in agricultural activity. Some of them may afford to access to private community clinics. Indeed, these private village clinics provide better quality but are more expensive than the former public community clinics. So, farmers may be excluded of the community facility for financial reason and they may be excluded of the public facility for geographical facility distribution reason[23]. That explains why we get a "side" effect of the industrialization process.

Thus, farmers who do not really gain benefit from China's tremendous industrial growth, are heavily hit by its side effects. These latter (side effects) contribute to increase the healthcare price, to a change in the framework of the healthcare facility and to an increase in the income inequality. If the income and the insurance system are keys factors to better the healthcare access of the less-advanded population, the industrial change plays a crucial and central role. We highlight that the higher the percent of non farmers in the village and the better the transportation system, the lower the healthcare demand of

[22]Except in some cases as university graduate individuals

[23]They also can be excluded of the public hospital for financial reason but the NCMS that covers for public healthcare expenditure should soften this effect

farmers and unskilled workers is. Today, our recommendation is the institution of a public policy to support the farmers and unskilled workers in the area where rural inhabitants have the less agricultural activity. There are several reasons that makes monetary transfer policy not the easiest policy tool to use. First, there are difficulties to control the use of the monetary transfert ; second, the induced demand may distorded its expected effect. Another policy tool could be a financial support the healthcare access in area where rural inhabitants have the less agricultural activity. It sould be an extended insurance coverage in these areas.

A naive but important question is why some rural inhabitants choose a agricultural activity? what are the characteristics of this population? What are the determinants of being a rural farmers? All this question deserve to focus on to be able to implement the most adequate policy. However, the farmers are not the only ones to undergo consequences of the changing patterns of healthcare utilizations. The unskilled workers that work outside the village, are in poorer working condition than the skilled ones, and sometimes as the farmers ones. this groups of people do not benefit from the NCMS program as easily as the farmers because they are only part-time in the village. They are also excluded of the workingplace healthcare program because of their registration permit, the "hukou". Therefore, a policy that aims to better the farmers healthcare access have also to take into account this internal migrant population.

Knowing that children tend to stay in the village even when parents chose to migrate, another crucial question is what the impact of the industrial process peer effect and so, the decrease in the healthcare demand on the next generation. At last, having more information on the mobility and on the private insurance for the rural inhabitant working in industrial activity will allow to desangle the effect of the three sources of inequality: wage, mobility, and private insurance.

In the urbanized area, with the economic reforms, the ability to make profit attracted people that led to the developpment of industrial activity and the internal migration. So, the economic developped is based on the internal unskilled migrants. What will be the next futur if this population is the ones excluded of the healthcare market?

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# 7 Appendix

Table 1: **By wave, Healthcare demand(%)**

| | **All** | **Insured** | **Uninsured** | **Self-care** | **Ignore** |
|---|---|---|---|---|---|
| 1991 | 76.88 | 84.38 | 76.51 | . | . |
| 1993 | 76.11 | - | 76.00 | 9.24 | 13.27 |
| 1997 | 75.75 | 71.19 | 76.28 | 15.65 | 6.29 |
| 2000 | 69.62 | 79.63 | 68.65 | 20.74 | 8.36 |
| 2004 | 55.64 | 62.50 | 54.73 | 27.84 | 14.37 |
| 2006 | 61.93 | 63.22 | 61.09 | 23.68 | 10.70 |
| Total | 65.18 | 65.27 | 65.17 | 22.54 | 11.41 |

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Table 2: **By wave, subjective health**

| **Wave** | **Good health** | **Fair health** | **Bad health** | **Very bad health** |
|---|---|---|---|---|
| 1991 | 13.66 | 62.73 | 20.78 | 2.83 |
| 1993 | 11.23 | 66.84 | 18.88 | 3.05 |
| 1997 | 13.13 | 62.25 | 20.89 | 3.72 |
| 2000 | 14.93 | 52.33 | 27.57 | 5.17 |
| 2004 | 14.61 | 46.26 | 32.62 | 6.51 |
| 2006 | 12.54 | 47.33 | 32.98 | 7.15 |
| Total | 13.31 | 56.74 | 25.31 | 4.65 |

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Table 3: **By wave, insurance and treatment price**

| Wave | Old-CMS | NCMS | Flu price | | |
|---|---|---|---|---|---|
| | | | Comm. clinic | Towns. hosp. | County hops. |
| 1991 | 5.45 | - | 3.74 | 4.51 | 6.39 |
| 1993 | 0.25 | - | 5.51 | 7.22 | 8.89 |
| 1997 | 10.57 | - | 13.15 | 16.44 | 22.91 |
| 2000 | 5.92 | - | 17.49 | 22.44 | 38.68 |
| 2004 | - | 10.25 | 19.28 | 28.98 | 46.45 |
| 2006 | - | 36.25 | 25.97 | 35.91 | 63.35 |
| Total | - | - | 14.17 | 18.70 | 29.80 |

The price has been adjusted to year 2006 using the price index offered by CHNS dataset.

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Table 4: **By area and wave: percent of farmers**

| | | All years | 1991 | 1993 | 1997 | 2000 | 2004 | 2006 |
|---|---|---|---|---|---|---|---|---|
| Liaoning | 21 | 48.04 | 55.38 | 48.99 | . | 51.09 | 49.55 | 35.15 |
| Heilongjiang | 23 | 71.31 | . | . | 74.83 | 78.35 | 64.82 | 66.28 |
| Jiangsu | 32 | 41.23 | 56.30 | 53.97 | 41.99 | 47.57 | 22.36 | 17.96 |
| Shandong | 37 | 44.58 | 47.83 | 45.33 | 44.40 | 52.56 | 40.81 | 37.75 |
| Henan | 41 | 68.97 | 79.60 | 81.95 | 65.06 | 59.82 | 65.69 | 63.56 |
| Hubei | 42 | 60.08 | 70.70 | 57.34 | 64.09 | 59.17 | 54.33 | 49.75 |
| Hunan | 43 | 48.46 | 68.83 | 49.62 | 56.28 | 48.92 | 31.85 | 27.29 |
| Guangxi | 45 | 59.85 | 64.63 | 59.39 | 59.99 | 73.81 | 52.63 | 50.49 |
| Guizhou | 52 | 65.83 | 83.18 | 69.04 | 64.66 | 59.97 | 58.04 | 53.96 |
| Total | | 56.49 | 66.71 | 58.70 | 59.05 | 58.99 | 49.60 | 45.01 |

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Table 5: **By area and wave, Household Income**

| | | **All years** | **1991** | **1993** | **1997** | **2000** | **2004** | **2006** |
|---|---|---|---|---|---|---|---|---|
| Liaoning | 21 | 5,851.20 | 3,008.97 | 3,459.59 | . | 5,880.44 | 7,638.84 | 9,166.28 |
| Heilongjiang | 23 | 5,765.09 | . | . | 4,046.97 | 4,668.96 | 7,208.96 | 7,639.02 |
| Jiangsu | 32 | 6,925.39 | 3,829.85 | 4,169.54 | 6,144.20 | 7,333.21 | 10,694.60 | 10,628.57 |
| Shandong | 37 | 5,171.13 | 2,675.54 | 3,117.62 | 4,565.50 | 5,759.16 | 6,868.07 | 8,717.79 |
| Henan | 41 | 3,924.31 | 2,527.55 | 2,275.93 | 3,505.83 | 3,657.07 | 4,998.76 | 6,456.47 |
| Hubei | 42 | 4,112.26 | 3,215.21 | 2,693.32 | 3,660.40 | 3,999.86 | 5,116.03 | 7,115.38 |
| Hunan | 43 | 5,203.22 | 3,489.28 | 4,141.16 | 4,874.97 | 4,551.08 | 7,083.28 | 7,842.50 |
| Guangxi | 45 | 4,323.01 | 3,061.83 | 4,158.77 | 4,138.83 | 4,807.84 | 4,748.53 | 5,080.48 |
| Guizhou | 52 | 3,342.35 | 2,166.16 | 2,688.29 | 2,842.46 | 3,438.38 | 4,380.36 | 5,249.14 |
| Total | | 4,843.02 | 2,975.66 | 3,352.48 | 4,164.55 | 4,900.60 | 6,424.60 | 7,403.65 |

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Table 6: **By wave, healthcare facilities distribution**

| **Wave** | **Clinic village** | **Nb facilities** | | **Distance** | |
|---|---|---|---|---|---|
| | | **Total** | **Private** | **Township** | **County** |
| 1991 | 0.77 | 3.33 | 0.09 | 1.94 | 11.29 |
| 1993 | 0.77 | 3.01 | 0.09 | 2.00 | 9.33 |
| 1997 | 0.82 | 3.32 | 0.19 | 1.93 | 9.95 |
| 2000 | 0.80 | 3.16 | 0.46 | 4.50 | 10.18 |
| 2004 | 0.86 | 2.74 | 0.40 | 1.60 | 8.69 |
| 2006 | 0.80 | 2.34 | 0.34 | 1.75 | 7.60 |
| Total | 0.81 | 2.99 | 0.27 | 2.35 | 9.70 |

*Source: China Health and Nutrition Survey (CHNS), 1991-2006*

Computed at the community level

Table 7: **Healthcare Demand**

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| ln(Income) | 0.0954*** | 0.0658* | 0.0945*** | 0.0788** | 0.0814** | 0.0739** | 0.0825** | 0.0775** |
| | (0.0365) | (0.0357) | (0.0365) | (0.0357) | (0.0385) | (0.0376) | (0.0387) | (0.0379) |
| Severity 2 | 0.542*** | 0.517*** | 0.542*** | 0.510*** | 0.576*** | 0.548*** | 0.576*** | 0.548*** |
| | (0.0732) | (0.0727) | (0.0732) | (0.0726) | (0.0780) | (0.0773) | (0.0780) | (0.0773) |
| Severity 3 | 1.154*** | 1.119*** | 1.154*** | 1.120*** | 1.141*** | 1.116*** | 1.140*** | 1.115*** |
| | (0.123) | (0.122) | (0.123) | (0.122) | (0.129) | (0.128) | (0.129) | (0.128) |
| SRH 2 | 0.318** | 0.316** | 0.321** | 0.317** | 0.304* | 0.302* | 0.304* | 0.304* |
| | (0.155) | (0.154) | (0.155) | (0.153) | (0.164) | (0.161) | (0.164) | (0.161) |
| SRH 3 | 0.222 | 0.222 | 0.226 | 0.217 | 0.205 | 0.184 | 0.205 | 0.185 |
| | (0.152) | (0.150) | (0.152) | (0.150) | (0.160) | (0.158) | (0.160) | (0.158) |
| SRH 4 | 0.125 | 0.129 | 0.130 | 0.118 | 0.0166 | -0.00713 | 0.0178 | -0.00443 |
| | (0.162) | (0.160) | (0.162) | (0.160) | (0.171) | (0.168) | (0.171) | (0.168) |
| Age: 18-25 | 0.0161 | 0.00535 | 0.0157 | -0.00174 | 0.0181 | 0.0155 | 0.0156 | 0.00956 |
| | (0.206) | (0.204) | (0.206) | (0.204) | (0.220) | (0.217) | (0.220) | (0.217) |
| Age: 25-39 | 0.121 | 0.0923 | 0.120 | 0.0956 | 0.164 | 0.134 | 0.162 | 0.129 |
| | (0.109) | (0.108) | (0.109) | (0.108) | (0.115) | (0.114) | (0.115) | (0.114) |
| Age: 39-55 | 0.0967 | 0.0733 | 0.0981 | 0.0767 | 0.101 | 0.0866 | 0.101 | 0.0869 |
| | (0.0874) | (0.0866) | (0.0874) | (0.0863) | (0.0936) | (0.0921) | (0.0936) | (0.0921) |
| Edu: 1-6ys | 0.0228 | 0.0190 | 0.0211 | 0.0430 | 0.0710 | 0.0963 | 0.0714 | 0.0975 |
| | (0.0894) | (0.0885) | (0.0894) | (0.0883) | (0.0945) | (0.0930) | (0.0946) | (0.0930) |
| Edu: 6-12ys | 0.0372 | 0.0448 | 0.0372 | 0.0620 | 0.00998 | 0.0343 | 0.0116 | 0.0397 |
| | (0.106) | (0.104) | (0.106) | (0.104) | (0.112) | (0.110) | (0.112) | (0.110) |
| Edu: >12ys | 0.310 | 0.141 | 0.310 | 0.160 | 0.280 | 0.170 | 0.297 | 0.219 |
| | (0.275) | (0.271) | (0.275) | (0.269) | (0.337) | (0.335) | (0.342) | (0.341) |
| Women | 0.191*** | 0.179** | 0.191*** | 0.193*** | 0.160** | 0.171** | 0.158** | 0.167** |
| | (0.0719) | (0.0712) | (0.0719) | (0.0711) | (0.0763) | (0.0752) | (0.0765) | (0.0754) |
| Unmarried | 0.266* | 0.296** | 0.264* | 0.290** | 0.272* | 0.282** | 0.272* | 0.278** |
| | (0.137) | (0.136) | (0.137) | (0.136) | (0.144) | (0.142) | (0.144) | (0.142) |
| Separated | -0.972** | -1.002** | -0.960** | -1.044** | -1.051** | -1.134*** | -1.053** | -1.140*** |
| | (0.422) | (0.422) | (0.423) | (0.421) | (0.440) | (0.437) | (0.440) | (0.438) |
| Widow | -0.106 | -0.0921 | -0.106 | -0.103 | -0.131 | -0.133 | -0.134 | -0.139 |
| | (0.117) | (0.116) | (0.117) | (0.115) | (0.124) | (0.122) | (0.124) | (0.122) |
| Farmer | -0.0415 | -0.00562 | -0.0443 | -0.0481 | -0.0644 | -0.0959 | -0.0678 | -0.108 |

*Continued on next page*

*Model A1: Healthcare Demand, continued*

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | (0.0853) | (0.0819) | (0.0853) | (0.0816) | (0.0894) | (0.0852) | (0.0901) | (0.0863) |
| Old CMS | 0.462* | 0.434* | 0.464* | 0.437* | 0.467* | 0.424* | 0.456* | 0.399 |
| | (0.251) | (0.249) | (0.251) | (0.249) | (0.253) | (0.250) | (0.255) | (0.252) |
| NCMSi | 0.274** | 0.268** | 0.242*† | 0.257*† | 0.199† | 0.228† | 0.192† | 0.209† |
| | (0.132) | (0.129) | (0.139) | (0.137) | (0.145) | (0.143) | (0.147) | (0.144) |
| NCMSc | -0.0177 | -0.0193 | -0.00689⋆ | -0.0545⋆ | -0.120⋆ | -0.191⋆ | -0.118⋆ | -0.183⋆ |
| | (0.167) | (0.161) | (0.167) | (0.166) | (0.180) | (0.177) | (0.180) | (0.177) |
| Price (*100) | | | | | -0.347 | -0.636** | -0.347 | -0.627** |
| | | | | | (0.321) | (0.269) | (0.321) | (0.269) |
| Other Ins. | | | | | | | -0.0431 | -0.113 |
| | | | | | | | (0.140) | (0.134) |
| Community | FE | RE | FE | RE | FE | RE | FE | RE |
| Province | | FE | | FE | | FE | | FE |
| Observations | 4900 | 4945 | 4900 | 4945 | 4398 | 4447 | 4398 | 4447 |

Standard errors in parentheses ; *** p<0.01, ** p<0.05, * p<0.1; Time fixed-effects and area fixed-effects not shown.

The two dummy variables (at the community level and at the household level) capturing possible differences between the treatment and control groups prior to the policy change, are not presented. † : The interaction term $NCMS_i$, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS insured effect. ⋆: The interaction term $NCMS_c$, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS county effect.

Table 8: **Controlling for urbanization, industrialization and healthcare change**

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| ln(Income) | 0.08* | 0.07 | 0.09** | 0.08** | 0.08* | 0.07* | 0.10** | 0.09** | 0.08* | 0.08* |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Farmer | -0.12 | -0.11 | -0.07 | -0.06 | -0.09 | -0.10 | | | -0.09 | -0.10 |
| | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | | | (0.09) | (0.09) |
| Old CMS | 0.35 | 0.33 | 0.47* | 0.41 | 0.39 | 0.33 | 0.37 | 0.31 | 0.38 | 0.33 |
| | (0.25) | (0.25) | (0.26) | (0.26) | (0.27) | (0.26) | (0.27) | (0.27) | (0.27) | (0.26) |
| NCMSi | 0.23 | 0.25* | 0.22 | 0.24 | 0.23 | 0.28* | 0.23 | 0.28* | 0.22 | 0.28* |

*Continued on next page*

*Model A2: Healthcare Demand controlling for urbanization, industrialization...., continued*

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| NCMSc | -0.09 | -0.12 | -0.14 | -0.17 | -0.16 | -0.20 | -0.15 | -0.19 | -0.16 | -0.19 |
| | (0.21) | (0.21) | (0.18) | (0.18) | (0.22) | (0.22) | (0.23) | (0.22) | (0.22) | (0.22) |
| Price (*100) | 0.15 | -0.21 | 0.09 | -0.23 | 0.24 | -0.14 | 0.22 | -0.17 | 0.24 | -0.11 |
| | (0.31) | (0.30) | (0.30) | (0.29) | (0.34) | (0.33) | (0.35) | (0.33) | (0.35) | (0.33) |
| Village clinic | 0.01 | 0.07 | | | -0.06 | 0.01 | -0.06 | 0.01 | -0.06 | 0.01 |
| | (0.15) | (0.14) | | | (0.16) | (0.15) | (0.16) | (0.15) | (0.16) | (0.15) |
| hopno | -0.04 | -0.03 | | | -0.05 | -0.04 | -0.05* | -0.04 | -0.05 | -0.04 |
| | (0.03) | (0.03) | | | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| % hop.Priv. | -0.21 | -0.36* | | | -0.27 | -0.43** | -0.26 | -0.41** | -0.27 | -0.42** |
| | (0.20) | (0.20) | | | (0.21) | (0.20) | (0.21) | (0.20) | (0.21) | (0.20) |
| Road shape | | | 0.17*** | 0.16*** | 0.21*** | 0.19*** | 0.22*** | 0.21*** | 0.21*** | 0.20*** |
| | | | (0.06) | (0.06) | (0.07) | (0.06) | (0.07) | (0.06) | (0.07) | (0.06) |
| Teleg | | | 0.12 | 0.16* | 0.08 | 0.12 | 0.07 | 0.11 | 0.08 | 0.12 |
| | | | (0.10) | (0.09) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Telep | | | 0.00 | 0.03 | 0.02 | 0.05 | 0.04 | 0.07 | 0.02 | 0.05 |
| | | | (0.12) | (0.12) | (0.13) | (0.13) | (0.13) | (0.13) | (0.13) | (0.13) |
| Post | | | 0.18 | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 |
| | | | (0.12) | (0.12) | (0.13) | (0.12) | (0.13) | (0.13) | (0.13) | (0.12) |
| Bus Stop | | | 0.01 | -0.05 | -0.02 | -0.07 | -0.02 | -0.07 | -0.02 | -0.07 |
| | | | (0.10) | (0.09) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Train Station | | | -0.20* | -0.26** | -0.19 | -0.27** | -0.20 | -0.29** | -0.18 | -0.27** |
| | | | (0.11) | (0.11) | (0.13) | (0.12) | (0.13) | (0.12) | (0.13) | (0.12) |
| %Farmer | | | -0.21 | -0.15 | -0.11 | -0.05 | -0.14 | -0.08 | -0.11 | -0.06 |
| | | | (0.20) | (0.19) | (0.21) | (0.19) | (0.21) | (0.20) | (0.21) | (0.20) |
| %Outsider | | | -0.58*** | -0.54*** | -0.45** | -0.40* | -0.42 | -0.36 | -0.46** | -0.42** |
| | | | (0.20) | (0.20) | (0.22) | (0.21) | (0.26) | (0.26) | (0.22) | (0.21) |
| %Outsider * Farmer | | | | | | | -0.54* | -0.49** | | |
| | | | | | | | (0.32) | (0.22) | | |
| Gini | | | | | | | | | 0.24 | 0.33 |
| | | | | | | | | | (0.55) | (0.53) |
| ln(Inc. Vill.) | | | | | | | | | 0.02 | -0.07 |
| | | | | | | | | | (0.14) | (0.14) |
| Community | FE | RE | FE | RE | FE | RE | FE | RE | FE | RE |
| Province | | FE | | FE | | FE | | FE | | FE |
| Observations | 4068 | 4068 | 4216 | 4216 | 3860 | 3860 | 3860 | 3860 | 3860 | 3860 |

Standard errors in parentheses ; *** p<0.01, ** p<0.05, * p<0.1; Controlling for Model A1 variables.
ln(Inc. Vill.): logarithm of the average income computed at the village level; Areakm: population size per square kilometer; Tradea: open trade area or special economic zone near the village; Teleg: Telegraph service; Telep: telephone service;

Postal: postal service; Road: 1: dirt, 2: stone, pavel or mixed material, 3: paved road; Bus: bus stop; Train: train station. The two dummy variables (at the community level and at the household level) capturing possible differences between the treatment and control groups prior to the policy change, are not shown. † : The interaction term NCMSi, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS insured effect. ⋆: The interaction term NCMSc, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS county effect. We also control for the different types of ocupation: skilled, unskilled, in service sector, other and crossed variables occupation-% of outsiders. All the coefficients are not significants. There can be provided on resquest.

Table 9: **Healthcare Demand on matched sample**

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| ln(Income) | 0.14*** | 0.11* | 0.39*** | 0.36** |
| | (0.04) | (0.22) | (0.06) | (0.16) |
| Severity 2 | 0.33*** | 0.36 | 0.77*** | 0.71** |
| | (0.10) | (0.27) | (0.13) | (0.30) |
| Severity 3 | 1.43*** | 1.44*** | 1.13*** | 1.03*** |
| | (0.17) | (0.51) | (0.19) | (0.33) |
| SRH 2 | 0.76*** | 0.57 | -0.85*** | -0.82** |
| | (0.20) | (0.39) | (0.27) | (0.39) |
| SRH 3 | 0.59*** | 0.33 | -0.60** | -0.54 |
| | (0.19) | (0.48) | (0.25) | (0.41) |
| SRH 4 | 0.45** | 0.11 | -0.95*** | -1.03*** |
| | (0.21) | (0.39) | (0.28) | (0.38) |
| Age:18-25 | -0.15 | -0.33 | -0.22 | -0.26 |
| | (0.30) | (0.38) | (0.43) | (0.82) |
| Age:25-39 | 0.68*** | 0.64* | 0.01 | -0.02 |
| | (0.15) | (0.37) | (0.19) | (0.26) |
| Age:39-55 | -0.03 | -0.14 | -0.19 | -0.21 |
| | (0.12) | (0.25) | (0.15) | (0.31) |
| Edu: 1-6ys | -0.09 | -0.04 | 0.03 | 0.10 |
| | (0.13) | (0.17) | (0.15) | (0.31) |
| Edu: 6-12ys | 0.48*** | 0.44 | 0.31* | 0.31 |
| | (0.16) | (0.27) | (0.18) | (0.44) |
| Edu: >12ys | 0.07 | 0.17 | | |

*Continued on next page*

*Model A3: Healthcare Demand on matched sample, continued*

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | (0.58) | (0.73) | | |
| Women | 0.58*** | 0.65*** | 0.56*** | 0.56*** |
| | (0.10) | (0.22) | (0.12) | (0.20) |
| Unmarried | 0.35* | 0.23 | 1.06*** | 1.05** |
| | (0.20) | (0.39) | (0.27) | (0.50) |
| Separated | -2.97*** | -2.95*** | | |
| | (0.73) | (0.94) | | |
| Widow | -0.40** | -0.53** | 0.10 | 0.11 |
| | (0.17) | (0.26) | (0.20) | (0.30) |
| Farmer | 2.89 | 2.83 | 1.14 | 1.05 |
| | (2.52) | (2.12) | (0.74) | (0.81) |
| Old CMS | 0.91*** | 1.08* | 1.37*** | 1.27*** |
| | (0.28) | (0.58) | (0.36) | (0.41) |
| NCMSi | 1.16*** | 0.58 | 0.16 | 0.12 |
| | (0.28) | (0.48) | (0.22) | (0.47) |
| NCMSc | 0.14 | 0.04 | 0.38 | 0.39 |
| | (0.18) | (0.26) | (0.43) | (0.70) |
| **Price (*100)** | **-0.75*** | **-1.22*** | **-1.83***** | **-2.28***** |
| | **(0.44)** | **(0.70)** | **(0.59)** | **(0.57)** |
| Road shape | 0.24*** | 0.10 | 0.19* | 0.15 |
| | (0.08) | (0.14) | (0.10) | (0.15) |
| Telegraph | 0.35*** | 0.44* | -0.16 | -0.10 |
| | (0.13) | (0.25) | (0.16) | (0.20) |
| Telephone | 0.66*** | 0.53 | 0.81*** | 0.64 |
| | (0.18) | (0.41) | (0.21) | (0.44) |
| Post | 0.60*** | 0.51* | 0.10 | -0.01 |
| | (0.17) | (0.27) | (0.21) | (0.53) |
| Bus Stop | 0.24* | 0.11 | 0.02 | 0.00 |
| | (0.14) | (0.19) | (0.17) | (0.25) |
| Train Station | -0.93*** | -0.68** | -1.14*** | -1.06*** |
| | (0.15) | (0.31) | (0.18) | (0.38) |
| %Farmer | 1.31*** | 0.76* | 0.55* | 0.46 |
| | (0.27) | (0.41) | (0.31) | (0.58) |
| %Outsider *Farmer | -0.39** | -0.35 | 0.58 | 0.68 |
| | (0.18) | (0.28) | (0.68) | (1.23) |
| **GINI** | **-3.48***** | **-4.10**** | **-0.79** | **-1.66** |
| | **(0.74)** | **(1.97)** | **(0.98)** | **(1.21)** |

*Continued on next page*

*Model A3: Healthcare Demand on matched sample, continued*

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **ln(Inc. Vill.)** | **0.46**** | **0.26** | **-0.02** | **0.12** |
| | **(0.20)** | **(0.30)** | **(0.23)** | **(0.23)** |
| %outsider | -1.92*** | -1.58*** | -1.13** | -1.57* |
| | (0.34) | (0.38) | (0.54) | (0.87) |
| villageclinic | 0.62 | -0.14 | -0.28 | 0.20 |
| | (0.51) | (0.40) | (0.33) | (0.42) |
| hopno | 0.03 | 0.06 | 0.08 | 0.05 |
| | (0.05) | (0.06) | (0.06) | (0.15) |
| % hop.Priv. | -0.58* | -0.11 | -0.21 | -0.30 |
| | (0.30) | (0.50) | (0.29) | (0.37) |
| Proposal | **A** | **A** | **B** | **B** |
| Community | FE | RE | FE | RE |
| Province | | FE | | FE |
| Observations | 3311 | 3329 | 2264 | 2264 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controlling for Model A1 variables

The two dummy variables (at the community level and at the household level) capturing possible differences between the treatment and control groups prior to the policy change, are not shown.

† : The interaction term NCMSi, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS insured effect.

⋆: The interaction term NCMSc, which is the same as a dummy variable equal to one for those observations in the treatment group in the second period, is the index of interest for NCMS county effect.